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RESPONSE OF TOMATO QUALITY (*LYCOPERSICON ESCULENTUM* MILL.) CV. HEEM SOHNA TO ORGANIC AND INORGANIC UNDER PROTECTED CULTIVATION

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ABSTRACT

The experiment was carried out in vegetable Research Farm, during mid-November to 8- may the year 2012 - 2013 with following combination of which was T_1 (control), T_2 (FYM 1.5 kg / m^2), T_3 (FYM 2.5 kg / m^2), T_4 ((30.86 g N 18.51 g P and 18.51 g K) / m^2), T_5 ((30.86 g N 18.51 g P and 18.51 g K / m^2 + FYM 1.5 kg / m^2), T_6 ((30.86 g N 18.51 g P and 18.51 g K) / m^2 + FYM 2.5 kg / m^2), T_7 ((46.29 g N 37.02 g P and 37.02 g K) / m^2), T_8 ((46.29 g N 37.02 g P and 37.02 g K) / m^2+ FYM 1.5 kg / m^2) T_9 ((46.29 g N 37.02 g P and 37.02 g K) / m^2+ FYM 2.5 kg / m^2), T_{10} (Micronutrient 2.5ml/l) T_{11} (FYM 1.5 kg / m^2+ Micronutrient 2.5ml/l T_{12} (FYM 2.5 kg / m^2 + Micronutrient 2.5ml/l) T_{13} ((30.86 g N 18.51 g P and 18.51 g K) / m^2 + Micronutrient 2.5ml/l) T_{14} ((30.86 g N 18.51 g P and 18.51 g K) / m^2 + FYM 1.5 kg / m^2 + Micronutrient 2.5ml/l) T_{15} ((30.86 g N 18.51 g P and 18.51 g K) / m^2 + FYM 2.5 kg / m^2 + Micronutrient 2.5ml/l) T_{16} ((46.29 g N 37.02 g P and 37.02 g K) / m^2+ Micronutrient 2.5ml/l) T_{17} ((46.29 g N 37.02 g P and 37.02 g K) / m^2+ FYM 1.5 kg / m^2+ Micronutrient 2.5 ml/l) and T_{18} ((46.29 g N 37.02 g P and 37.02 g K) / m^2+ FYM 2.5 kg / $m^{2\,+}$ Micronutrient 2.5ml/l. The cultivar of tomato was "heem shona"syngenta company. The highest Chlorophyll pigment (221.17 mg / 100 g), lycopene pigment (3.49 mg / 100 g), shelf life (19.83 days) Total soluble solid (^{0}Brix) (5.77) and Vitamin C (25.50 mg / 100 g) was recorded in T_{18} treatment.

KEYWORDS: Tomato, *Lycopersicon esculentum* Mill, Chlorophyll Pigment, Lycopene Pigment, Shelf Life, Vitamin C and "Heem Shona"

INTRODUCTION

Tomato *(Lycopersicon esculentum* Mill.) belongs to family solanaceae having chromosome number (2n=24), it is a self pollinated crop. Tomato one of most popular and nutritious fruit vegetable; widely grown around the world and second ranked after potato. Tomato has its origin in Peru, Ecuador and Bolivia on the basis of availability of numerous wild and cultivated relatives of the tomato in this area. From its centre of origin, the tomato first moved to Mexico for domestication and cultivation. From Mexico it arrived in Europe by 1554. The major tomato growing countries are China India, USA, Turkey, Egypt, and Italy, In the world total area under tomato is 4582438 thousand ha with production of 150513813 thousand tones and with productivity of 32.8 tones/ha in 2010 - 2011. Total area under tomato crop in India is assessed to be 0.865 million ha with the productivity of (16.826.000 tones) with productivity of 19.5 tones/ha [4]. Tomato is consumed fresh and also in processed form of which one-third is used as processed products and two-third of tomato fruit is consumed fresh.

The area under tomato is constantly increasing to produce more quality yield because it is a major vegetable in the menu of human diet. The fruits are eaten raw or cooked, large quantities of tomato are used to produce soup, juice, ketchup, puree, paste and powder. Tomato is a rich source of vitamin, minerals, organic acids, sugars, ascorbic acids, acidity and lycopene. Nutritive value varies in different cultivars depending upon the agro-climatic condition. It is also rich

in nutrients and calories. It is a good source of Fe and vitamin A, B, and C. A .Edible portion of Tomato contain. Energy 18 kcal, protein 0.95 g, fat 0.11g, carbohydrate 4.01 g sugars total 2.49 g, Ca 11mg, Fe 0.68 mg, Mg 9 mg, P 28 mg, K 218 mg, Na 11 mg, Zn 0. 14 mg, Vitamin C 22.8 mg Thiamin 0.036 mg, Riboflavin 0.022 mg, Vitamin B-6 0.079 mg, Vitamin E 0.56 mg, Fatty acids, total saturated 0.015 g Fatty acids, total polyunsaturated 0.044 g per 100 g [10]**.** Consumption of tomato and its products can significantly reduce the risk of developing of colon, rectal, and stomach cancer. Recent studies suggest that tomatoes contain the antioxidant lycopene, the most common form of carotenoid, which markedly reduces the. Risk of prostate cancer [6]**.**

To improve the quality of the produce, it is necessary to pay attention on the optimum balanced use of nutrients through fertilizer application. F.Y.M contains 0.5 per cent N, 0.2 percent P_2O_5 and 0.5 per cent K_2O to improves the soil tilth, aeration, water holding capacity of the soil and stimulates the activity of micro-organisms in the soil that make the elements readily available to the crops .Mineral elements like N.P.K, B,Mg and Zn can improve the quality of tomato. Therefore the present investigation was undertaken to find out the best combination of organic manures and inorganic fertilizers for obtaining the higher quality of tomato Tomato is a warm season crop and requires relatively long season to produce a profitable crop. it is highly susceptible to frost. Environment factors such as temperature and moisture etc. markedly influence on quaility of tomato and subsequent in fruit development and yield [3]. The optimum temperature for most varieties between 18 to 24 °C. But the plant tissues are damaged below 10 °C and above 38 °C . keeping all the fact in view a field experiment entitled To study effect of FYM NPK and micronutrients on quality of tomato (*Lycopersicon esculentum* Mill.) under protected cultivation on hybrid. indeterminate variety heem sohna syngenta company.

MATERIAL AND METHODS

The present investigation **"**Effect of FYM, N P K and Micronutrients on quality of tomato (*Lycopersicon esculentum* Mill.) under protected cultivation**"** was carried out during winter season during mid-November to 8- may the year 2012 - 2013 at Vegetable Research Farm, Department of Horticulture, Allahabad School of Agriculture, Sam Higginbottom Institute of Agriculture, Technology & Science Allahabad (U.P.) The experiment was laid out in split split plot design with three replications and eighteen treatments

Treatments Detail

T1 (control)

T2 FYM 1.5 kg / m^2

T3 FYM 2.5 kg / m^2

T4 (30.86 g N 18.51 g P and 18.51 g K) / m^2

T5 (30.86 g N 18.51 g P and 18.51 g K) / m^2 + FYM 1.5 kg / m^2

T6 (30.86 g N 18.51 g P and 18.51 g K / m^2 + FYM 2.5 kg / m^2

T7 (46.29 g N 37.02 g P and 37.02 g K) / m^2

T8 (46.29 g N 37.02 g P and 37.02 g K) / m^2+ FYM 1.5 kg / m^2

T9 (46.29 g N 37.02 g P and 37.02 g K) / m^2+ FYM 2.5 kg / m^2

T10 Micronutrient 2.5ml/l

T11 FYM 1.5 kg / m^2+ Micronutrient 2.5ml/l

T12 FYM 2.5 kg/ m^2 + Micronutrient 2.5ml/l

T13 (30.86 g N 18.51 g P and 18.51 g K / m^2 + Micronutrient 2.5ml/l

T14(30.86 g N 18.51 g P and 18.51 g K) / m^2 + FYM 1.5 kg / m^2 + Micronutrient 2.5ml/l

T15 T15 (30.86 g N 18.51 g P and 18.51 g K) / m^2+ FYM 2.5 kg /m^2 + Micronutrient 2.5ml/l

T16(46.29 g N 37.02 g P and 37.02 g K / m^2+ Micronutrient 2.5ml/l

T17(46.29 g N 37.02 g P and 37.02 g K) / m^2+ FYM 1.5 kg / m^2+ Micronutrient 2.5ml/l

T18 (46.29 g N 37.02 g P and 37.02 g K) / m^2+ FYM 2.5 kg / m^{2+} Micronutrient 2.5ml/l

A normal sized flat bed was prepared in the departmental nursery in the month of 7 October 2012. After arriving seedling to second true leaves, uniform size and healthy seedlings was selected for the transplanting into the sack to planting seedling separately. after arriving to the forth true leaves transplanting was done into the main field., The fertilizer was applied @ recommended dose viz., 30.86 g N 18.51 g P_2O_5 and 18.51 g K_2O per m^2 and 46.29 g N 37.02 g P_2O_5 and 37.02 g K_2O per m^2 half of the dose of nitrogen and entire quantity of P and K was applied as a basal dose before transplanting and well mixed with the soil and adding 1.5 kg and 2.5 kg farm yard manure (FYM) per m^2 according to the treatments.Remaining dose of nitrogen was applied at 40 days after transplanting, micronutrient @ 2.5 ml / l was sprayed at two weeks after transplanting and at flowering, The fertilizers was given in the form of urea, SSP and MOP FYM and Micronutrient SONAMIN - L

Estimation of Quality Traits are as Follows

- Chlorophyll content in leaves (Mg per 100 g) by [9]
- Lycopene pigment (mg / 100 g) by [9].
- shelf life. The shelf life of fruits was decided based on the appearance and spoilage of fruits. When 50 per cent of fruits showed symptoms of shrinkage or spoilage due to pathogens that lot of fruits were considered to have reached end of shelf life.
- Total soluble solid (^{0}Brix) With the use Erma Japan hand refract meter the T. S. S of 10 fruits of each treatment were recorded as the percentage [1].
- Vitamin C (g / 100 g) by [1].

RESULTS AND DISCUSSIONS

Chlorophyll (Mg / 100 g)

The data presented in table 1 clearly showed that the micronutrient played significant role in affecting chlorophyll. The maximum chlorophyll was recorded statistically significant in micronutrient application@ 2.5 $ml.l^{-1}$ which was recorded (157.56 mg / 100 g), superior over control which was recorded (142.76 mg / 100 g). Result showed that NPK significantly affected on chlorophyll where NPK levels superior over control, where (46.29 $g.m^2$) level gave highest chlorophyll (169.33 mg / 100 g), followed by @ 30.86 $g.m^2$ (148.39 mg / 100 g). The minimum chlorophyll was noticed with Control (132.75 mg / 100 g). Result showed that FYM significantly affected on chlorophyll where FYM levels superior over control, where (2.5 kg. m^2) level gave highest chlorophyll (169.61 mg / 100 g) followed by @ 1.5 $kg.m^2$ (148.78 mg / 100 g). The minimum chlorophyll was noticed with Control (132.08 mg / 100 g). NPK combination with micronutrient played significant role in affecting chlorophyll where superior interaction (46.29 $g.m^2$ NPK + 2.5 $ml.l^{-1}$

micronutrient) on other interaction which was recorded (183.44 mg / 100 g), followed by @ 46.29 g. m^2 NPK only (155.22 mg / 100 g)

The minimum chlorophyll was noticed with Control (129.44 mg / 100 g). FYM combination with micronutrient played significant role in affecting chlorophyll where superior interaction (2.5 kg.m^2 FYM + 2.5 ml.l^{-1} micronutrient) on other interaction which was recorded (181.72 mg / 100 g), followed by @ 2.5 kg.m^2 FYM only (157.50 mg / 100 g). The minimum chlorophyll was noticed with Control (129.11 mg / 100 g). FYM combination with NPK played significant role in affecting chlorophyll where superior interaction (2.5 kg. m^2 FYM + 46.29 g.m^2 NPK) on other interaction which was recorded (194.33 mg / 100 g), followed by @ 2.5 kg.m^2 FYM + 30.86 g.m^2 NPK (168.33 mg / 100 g).

The minimum chlorophyll was noticed with Control (121.25 mg / 100 g). The maximum chlorophyll (221.17 mg / 100 g) was indicated in interaction between FYM_2 and NPK_2 under M_1 followed by @ FYM_1 and NPK_2 under M_1 (181.00 mg / 100 g). The minimum chlorophyll was recorded in control (120.00 mg / 100 g). These result are in close conformity with the finding of [8] and [2]**.**

Lycopene Pigment (Mg / 100 g)

The data presented in table 2 clearly showed that the micronutrient played significant role in affecting lycopene pigment. The maximum lycopene pigment was recorded statistically significant in @ 2.5 ml.l^{-1} which was recorded (2.71 mg / 100 g) superior over control which was recorded (2.50 mg / 100 g) .Result showed that NPK significantly affected on lycopene pigment where NPK levels superior over control, where (46.29 g.m^2) level gave highest lycopene pigment (2.89 mg / 100 g), followed by @ 30.86 g. m^2 (2.60 mg / 100 g).

The minimum lycopene pigment (2.33 mg / 100 g) was noticed with Control. Result showed that FYM significantly affected on lycopene pigment where FYM levels superior over control, where (2.5 kg.m^2) level gave highest lycopene pigment (2.89 mg / 100 g), followed by @ 1.5 kg. m^2 (2.60 mg / 100 g.The minimum lycopene pigment (2.33 mg / 100 g) was noticed with Control.NPK combination with micronutrient played significant role in affecting lycopene pigment where superior interaction (46.29 g.m^2 NPK+2.5 ml.l^{-1} micronutrient) on other interaction which was recorded (3.08 mg / 100 g, followed by @ 46.29 g.m^2 NPK only and @ 30.86 g.m^2 + 2.5 ml/l (2.70 mg / 100 g.

The minimum lycopene pigment was noticed with Control (2.30 mg / 100 g). FYM combination with micronutrient played significant role in affecting lycopene pigment where superior interaction (2.5 kg. m^2 FYM + 2.5 ml.l^{-1} micronutrient) on other interaction which was recorded (3.06 mg / 100 g), followed by @ 2.5 kg. m^2 FYM only (2.73 mg / 100 g). The minimum lycopene pigment was noticed with Control (2.29 mg / 100 g). FYM combination with NPK played significant role in affecting lycopene pigment where superior interaction (2.5 kg.m^2 FYM + 46.29 g.m^2 NPK) on other interaction which was recorded (3.21 mg / 100 g) followed by @ 2.5 kg. m^2 FYM + 30.86 g.m^2 NPK (2.95 mg / 100 g)

The minimum lycopene pigment was noticed with Control (2.18 mg / 100 g). The maximum lycopene pigment (3.49 mg / 100 g) was indicated in interaction between FYM_2 and NPK_2 under M_1 followed by @ FYM_1 and NPK_2 under M_1 (3.20 mg / 100 g). The minimum lycopene pigment was recorded in control (2.15 mg / 100 g). These result are in close conformity with the finding of [5].

Shelf Life (Days)

The data presented in table 3 clearly showed that the micronutrient played significant role in affecting shelf life. The maximum shelf life was recorded statistically significant in micronutrient application @2.5 ml.l^{-1} which was recorded

(16.14 days) superior over control which was recorded (15.00 days).Result showed that NPK significantly affected on shelf life where NPK levels superior over control, where (46.29 g.m^2) level gave highest shelf life (17.08 days), followed by @ 30.86 g. m^2 (15.52 days). The minimum shelf life was noticed with Control (14.12 days).Result showed that FYM significantly affected on shelf life where FYM levels superior over control, where (2.5 kg. m^2) level gave highest shelf life (17.09 days), followed by @ 1.5 kg.m^2 (15.55 days).

The minimum shelf life was noticed with Control (14.07 days). NPK combination with micronutrient played significant role in affecting shelf life where superior interaction (46.29 g.m^2 NPK + 2.5 ml.l^{-1} micronutrient) on other interaction which was recorded (18.11days), followed by @ 46.29 g.m^2 NPK only (16.04 days). The minimum shelf life was noticed with Control (13.91 days). FYM combination with micronutrient played significant role in affecting shelf life where superior interaction (2.5 kg. m^2 FYM + 2.5 ml.l^{-1} micronutrient) on other interaction which was recorded (17.85 day), followed by @ 2.5 kg.m^2 FYM only (16.33 days).

The minimum shelf life was noticed with Control (13.89 days). FYM combination with NPK played significant role in affecting shelf life where superior interaction (2.5 kg.m^2 FYM + 46.29 g.m^2 NPK) on other interaction which was recorded (18.67 days), followed by @ 2.5 kg.m^2 FYM + 30.86 g.m^2 NPK (17.44 days). The minimum shelf life was noticed with Control (13.25 days). The maximum shelf life (19.83 days) was indicated in interaction between FYM_2 and NPK_2 under M_1 followed by @ FYM_1 and NPK_2 under M_1 (19.17 days). The minimum shelf life was recorded in control (13.00). These result are in close conformity with the finding of [8].

Total Soluble Solid (^{0}Brix)

The data presented in table 4 clearly showed that the micronutrient played significant role in affecting total soluble solid. The maximum total soluble solid was recorded statistically significant in micronutrient application @2.5 ml.l^{-1} which was recorded (5.56). superior over control which was recorded (5.46). Result showed that NPK significantly affected on total soluble solid where NPK levels superior over control, where (46.29 g.m^2) level gave highest total soluble solid (5.63), followed by @ 30.86 g.m^2 (5.54). The minimum total soluble solid was noticed with Control (5.37). Result showed that FYM significantly affected on total soluble solid where FYM levels superior over control, where (2.5 kg.m^2) level gave highest total soluble solid (5.63), followed by @ 1.5 kg.m^2 (5.54).

The minimum total soluble solid was noticed with Control (5.36). NPK combination with micronutrient played significant role in affecting total soluble solid where superior interaction (46.29g.m^2 NPK+2.5 ml.l^{-1} micronutrient) on other interaction which was recorded (5.67), followed by @ 46.29 g.m^2 NPK only (5.59).

The minimum total soluble solid was noticed with Control (5.28).FYM combination with micronutrient played significant role in affecting total soluble solid where superior interaction (2.5 kg.m^2 FYM+ 2.5ml.l^{-1} micronutrient) on other interaction which was recorded (5.67), followed by @ 2.5 kg.m^2 FYM only (5.59). The minimum total soluble solid was noticed with Control (5.28).FYM combination with NPK played significant role in affecting total soluble solid where superior interaction (2.5 kg.m^2 FYM + 46.29 g.m^2 NPK) on other interaction which was recorded (5.71), followed by @ 2.5 kg.m^2 FYM + 30.86 g.m^2 NPK and 1.5 kg.m^2 +46.29 g.m^2 (5.66)

The minimum total soluble solid was noticed with Control (5.16). The maximum total soluble solid (5.77) was indicated in interaction between FYM_2 and NPK_2 under M_1 followed by @ FYM_1 and NPK_2 under M_1 (5.70). The minimum total soluble solid was recorded in control (4.98). These result are in close conformity with the finding of [7].

Vitamin C (g / 100 g)

The data presented in table 5 clearly showed that the micronutrient played significant role in affecting vitamin C.The maximum vitamin C was recorded statistically significant in micronutrient application @ 2.5 $ml.l^{-1}$ which was recorded (22.05 mg / 100 g) superior over control which was recorded (20.86 mg / 100 g) .Result showed that NPK significantly affected on vitamin C where NPK levels superior over control, where (46.29 $g.m^2$) level gave highest vitamin C (22.98 mg / 100 g), followed by @ 30.86 $g.m^2$ (21.51 mg / 100 g). The minimum vitamin C was noticed with Control (19.87 mg / 100 g). Result showed that FYM significantly affected on vitamin C where FYM levels superior over control, where (2.5 kg. m^2) level gave highest vitamin C (23.03 mg / 100 g) followed by @ 1.5 $kg.m^2$ (21.53 mg/100 g).

The minimum vitamin C was noticed with Control (19.80 mg / 100 g). NPK combination with micronutrient played significant role in affecting vitamin C where superior interaction (46.29 $g.m^2$ NPK + 2.5 $ml.l^{-1}$ micronutrient) on other interaction which was recorded (23.95 mg / 100 g), followed by @ 46.29 $g.m^2$ NPK only (22.01 mg/ 100 g).

The minimum vitamin C was noticed with Control (19.53 mg / 100 g). FYM combination with micronutrient played significant role in affecting vitamin C where superior interaction (2.5 $kg.m^2$ FYM + 2.5 $ml.l^{-1}$ micronutrient) on other interaction which was recorded (23.87 mg /100 g), followed by @ 2.5 $kg.m^2$ FYM only (22.19 mg / 100 g). The minimum vitamin C was noticed with Control (19.43 mg / 100 g).FYM combination with NPK played significant role in affecting vitamin C where superior interaction (2.5 $kg.m^2$ FYM + 46.29 $g.m^2$ NPK) on other interaction which was recorded (24.25 mg /100 g), followed by @ 2.5 $kg.m^2$ FYM + 30.86 $g.m^2$ NPK (23.53 mg / 100 g.

The minimum vitamin C was noticed with Control (18.69 mg / 100 g). The maximum vitamin C (25.50 mg / 100 g) was indicated in interaction between FYM_2 and NPK_2 under M_1 followed by @ FYM_1 and NPK_2 under M_1 (24.80 mg /100 g).The minimum vitamin C was recorded in control (18.17 mg / 100 g). These result are in close conformity with the finding [5] and [8]**.**

CONCLUSIONS

Based on the result of experiment it was aimed to identify suitable treatment for tomato with respect to quality during November to May .it may be concluded that the treatment T_{18} (2.5kg.m^2 FYM + 46.29 $g.m^2$ NPK + 2.5 $ml.l^{-1}$ micronutrient) was recorded the best among treatment combinations on quality. The treatment T_{18} was obtained the highest quality of tomato heem sohna variety under protected cultivation.

DISCUSSIONS

Despite its economic importance, growers are not in a position to produce good quality tomato due to various biotic (pest and diseases), abiotic (rainfall, temperature, relative humidity and light intensity). Due to erratic behavior of weather, the crops grown in open field are often exposed to fluctuating levels of temperature, humidity. Besides this, limited availability of land for cultivation hampers the vegetable production. Hence, to obtain a good quality produce during off season, there is a need to cultivate tomato under protected conditions such as green house, poly house and net house etc.

The integration of organic manures such as FYM in combination with inorganic fertilizers NPK and micronutrients was found significant in improving quality than the sole application of either of these nutrients. This combination result in solubilization of plant nutrients which lead to increased up take of NPK. Mixing of organic and inorganic nutrients reduce the nutrient losses, improving the fertilizer use efficiency thus increasing the soil nutrient availability. And involved in cell division, photosynthesis and metabolism of carbohydrates where potash regulated proper

translocation of photosynthesis and stimulated enzyme activity which in turn might have increased the rate of growth and positive improve in quality characters which is resulted in high quality of tomato Further, application of organic manure along with NPK under micronutrient which might have accelerated the vigorous growth and improve quality of tomato plant. It is also relevant to mention that tomato plants nourished with interaction among NPK FYM and micronutrient gave maximum quality parameter

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APPENDICES

Table 1: Effect of FYM NPK and Micronutrients on Chlorophyll Pigment of Tomato (*Lycopersicon esculentum* Mill)

Treatments		**Chlorophyll (mg/100g) of Tomato**	**Treatments**	**Chlorophyll (mg/100g) of Tomato**		
Main Plot (M)				**NPK_0**	**NPK_1**	**NPK_2**
M_0		142.76	**M_0**	129.44	143.61	155.22
M_1		157.56	**M_1**	136.06	153.17	183.44
	F – test	S	F – test		S	
	S. Ed. (±)	2.374	S. Ed. (±)		3.938	
	CD at 5%	10.215	CD at 5%		9.08	
Sub Plot NPK (I)			**Treatments**	**F_0**	**F_1**	**F_2**
NPK_0		132.75	**M_0**	129.11	141.67	157.5
NPK_1		148.39	**M_1**	135.06	155.89	181.72
NPK_2		169.33			S	
	F – test	S	F – test		3.312	
	S. Ed. (±)	2.784	S. Ed. (±)		6.837	
	CD at 5%	6.42	CD at 5%			

Table 1: Contd.,

Sub Sub Plot FYM (F)			Treatments	F_0	F_1	F_2
F_0		132.08	**NPK_0**	121.25	130.83	146.17
F_1		148.78	**NPK_1**	129.33	147.5	168.33
F_2		169.61	**NPK_2**	145.67	168	194.33
	F – test	S	F – test		S	
	S. Ed. (±)	2.342	S. Ed. (±)		4.057	
	CD at 5%	4.834	CD at 5%		8.373	
Treatments	**Chlorophyll (mg/100g) of Tomato**					
	M_0			**M_1**		
	NPK_0	**NPK_1**	**NPK_2**	**NPK_0**	**NPK_1**	**NPK_2**
F_0	120	124.17	143.17	122.5	134.5	148.17
F_1	124.17	145.83	155	137.5	149.17	181
F_2	144.17	160.83	167.5	148.17	175.83	221.17
F – test			S			
S. Ed. (±)			5.737			
CD at 5%			11.841			

Table 2: Effect of FYM NPK and Micronutrients on Lycopene Pigment of Tomato (*Lycopersicon esculentum* Mill)

Treatments		Lycopene Pigment (Mg/100 G) of Tomato	Treatments	Lycopene Pigment (Mg/100 G) of Tomato		
Main Plot (M)				**Npk_0**	**Npk_1**	**Npk_2**
M_0		2.5	**M_0**	2.3	2.5	2.7
M_1		2.71	**M_1**	2.36	2.7	3.08
	F – test	S	F – test		S	
	S. Ed. (±)	0.018	S. Ed. (±)		0.02	
	CD at 5%	0.078	CD at 5%		0.047	
Sub Plot NPK (I)			**Treatments**	**F_0**	**F_1**	**F_2**
NPK_0		2.33	**M_0**	2.29	2.48	2.73
NPK_1		2.6	**M_1**	2.36	2.72	3.06
NPK_2		2.89			S	
	F – test	S	F – test		0.03	
	S. Ed. (±)	0.014	S. Ed. (±)		0.061	
	CD at 5%	0.033	CD at 5%			
Sub Sub Plot FYM (F)			**Treatments**	**F_0**	**F_1**	**F_2**
F_0		2.33	**NPK_0**	2.18	2.29	2.52
F_1		2.6	**NPK_1**	2.28	2.57	2.95
F_2		2.89	**NPK_2**	2.52	2.94	3.21
	F – test	S	F – test		S	
	S. Ed. (±)	0.021	S. Ed. (±)		0.036	
	CD at 5%	0.043	CD at 5%		0.075	
Treatments	**Lycopene Pigment (Mg / 100 G) of Tomato**					
	M_0			**M_1**		
	NPK_0	**NPK_1**	**NPK_2**	**NPK_0**	**NPK_1**	**NPK_2**
F_0	2.15	2.25	2.48	2.21	2.32	2.55
F_1	2.25	2.5	2.69	2.33	2.64	3.2
F_2	2.49	2.77	2.93	2.55	3.13	3.49
F – test			S			
S. Ed. (±)			0.051			
CD at 5%			0.106			

Table 3: Effect of FYM NPK and Micronutrients on Shelf Life of Tomato (*Lycopersicon esculentum* Mill)

Treatments		Shelf Life (Days) of Tomato	Treatments	Shelf Life (Days) of Tomato		
Main Plot (M)				**NPK_0**	**NPK_1**	**NPK_2**
M_0		15	**M_0**	13.91	15.06	16.04
M_1		16.14	**M_1**	14.33	15.98	18.11
	F – test	S	F – test		S	
	S. Ed. (±)	0.044	S. Ed. (±)		0.154	
	CD at 5%	0.188	CD at 5%		0.356	
Sub Plot NPK (I)			**Treatments**	**F_0**	**F_1**	**F_2**
NPK_0		14.12	**M_0**	13.89	14.78	16.33
NPK_1		15.52	**M_1**	14.26	16.32	17.85
NPK_2		17.08			S	
	F – test	S	F – test		0.169	
	S. Ed. (±)	0.109	S. Ed. (±)		0.349	
	CD at 5%	0.251	CD at 5%			
Sub Sub Plot FYM (F)			**Treatments**	**F_0**	**F_1**	**F_2**
F_0		14.07	**NPK_0**	13.25	13.94	15.17
F_1		15.55	**NPK_1**	13.8	15.32	17.44
F_2		17.09	**NPK_2**	15.17	17.4	18.67
	F – test	S	F – test		S	
	S. Ed. (±)	0.12	S. Ed. (±)		0.207	
	CD at 5%	0.247	CD at 5%		0.428	

Treatments	Shelf Life (Days) of Tomato					
	M_0			**M_1**		
	NPK_0	**NPK_1**	**NPK_2**	**NPK_0**	**NPK_1**	**NPK_2**
F_0	13	13.67	15	13.5	13.93	15.33
F_1	13.72	15	15.63	14.17	15.63	19.17
F_2	15	16.5	17.5	15.33	18.38	19.83
F – test			S			
S. Ed. (±)			0.293			
CD at 5%			0.605			

Table 4: Effect of FYM NPK and Micronutrients on Total Soluble Solid(^{0}Brix) of Tomato (*Lycopersicon esculentum* Mill)

Treatments		Total Soluble Solid (0Brix) of Tomato	Treatments	Total Soluble Solid (0Brix) of Tomato		
Main Plot (M)				**Npk_0**	**Npk_1**	**Npk_2**
M_0		5.46	**M_0**	5.28	5.51	5.59
M_1		5.56	**M_1**	5.45	5.57	5.67
	F – test	S	F – test		S	
	S. Ed. (±)	0.01	S. Ed. (±)		0.011	
	CD at 5%	0.043	CD at 5%		0.025	
Sub Plot NPK (I)			**Treatments**	**F_0**	**F_1**	**F_2**
NPK_0		5.37	**M_0**	5.28	5.51	5.59
NPK_1		5.54	**M_1**	5.44	5.58	5.67
NPK_2		5.63			S	
	F – test	S	F – test		0.017	
	S. Ed. (±)	0.08	S. Ed. (±)		0.036	
	CD at 5%	0.018	CD at 5%			
Sub Sub Plot FYM (F)			**Treatments**	**F_0**	**F_1**	**F_2**
F_0		5.36	**NPK_0**	5.16	5.42	5.53
F_1		5.54	**NPK_1**	5.42	5.55	5.66
F_2		5.63	**NPK_2**	5.52	5.66	5.71
	F – test	S	F – test		S	
	S. Ed. (±)	0.012	S. Ed. (±)		0.021	
	CD at 5%	0.025	CD at 5%		0.044	

Table 4: Contd.,

Treatments	Total Soluble Solid (0Brix) of Tomato					
	M_0			M_1		
	NPK_0	NPK_1	NPK_2	NPK_0	NPK_1	NPK_2
F_0	4.98	5.37	5.5	5.33	5.47	5.53
F_1	5.37	5.53	5.62	5.47	5.57	5.7
F_2	5.5	5.63	5.65	5.55	5.68	5.77
F – test			S			
S. Ed. (±)			0.03			
CD at 5%			0.062			

Table 5: Effect of FYM NPK and Micronutrients on Vitamin C (mg/100 g) of Tomato (*Lycopersicon esculentum* Mill)

Treatments		Vitamin C (mg/100 g) of Tomato	Treatments	Vitamin C (mg/100 g) of Tomato		
Main Plot (M)				Npk_0	Npk_1	Npk_2
M_0		20.86	**M_0**	19.53	21.03	22.01
M_1		22.05	**M_1**	20.21	21.98	23.95
	F – test	S	F – test		S	
	S. Ed. (±)	0.028	S. Ed. (±)		0.105	
	CD at 5%	0.121	CD at 5%		0.241	
Sub Plot Npk (I)			**Treatments**	**F_0**	**F_1**	**F_2**
NPK_0		19.87	**M_0**	19.43	20.94	22.19
NPK_1		21.51	**M_1**	20.16	22.12	23.87
NPK_2		22.98			S	
	F – test	S	F – test		0.166	
	S. Ed. (±)	0.074	S. Ed. (±)		0.343	
	CD at 5%	0.171	CD at 5%			
Sub Sub Plot FYM (F)			**Treatments**	**F_0**	**F_1**	**F_2**
F_0		19.8	**NPK_0**	18.69	19.61	21.31
F_1		21.53	**NPK_1**	19.52	21.47	23.53
F_2		23.03	**NPK_2**	21.18	23.51	24.25
	F – test	S	F – test		S	
	S. Ed. (±)	0.117	S. Ed. (±)		0.203	
	CD at 5%	0.242	CD at 5%		0.42	

Treatments	Vitamin C (mg / 100 g) of Tomato					
	M_0			M_1		
	NPK_0	NPK_1	NPK_2	NPK_0	NPK_1	NPK_2
F_0	18.17	19.32	20.82	19.22	19.72	21.55
F_1	19.38	21.22	22.22	19.83	21.72	24.8
F_2	21.03	22.55	23	21.58	24.52	25.5
F – test			S			
S. Ed. (±)			0.288			
CD at 5%			0.594			

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